Competition amongst the European states saw significant advancements in military technology that enabled the overpowering and acquisition of less-developed states and lands throughout the rest of the world. The European states in this time appeared to be in line with Machiavelli's (p xvii) statement 'that a prince must not have any other object nor any other thought, nor must he adopt anything as his art but war, its institutions, and its discipline' and as Rabb says 'as the fighting became endemic almost throughout the Continent, "improved" constantly by innovative technology, an incipient anarchy began to hover over international affairs' (p75). Within this backdrop of religious and political unrest, the close proximity of states within Europe proved in the end to be a major benefit to the eventual leaps in development the western European states saw from shared knowledge and a culture of competition. There are several factors that must be considered when discussing the advancement of Europe over the rest of the world. First we will review the nature of military technology development that gave the rising European powers an increasing margin of advantage and then in more detail, the affect of the strength of sea power over the existing sea technology. The cultural differences must then be considered and how attitudinal approaches affected the 'rest of the world's' reaction to European empirical aspirations and the introduction of European technology to their sphere.

Warfare in the sixteenth century underwent a revolution. From weaponry to tactics and organisation, there were many changes that the military forces of the European states underwent. Previously, warfare involved strategy as complex as two lines of cavalry and infantry battling against each other and of basic siege tactics. By the sixteenth century, strategies such as the 'pike square'- a square of infantry that involved many rows and could fight off larger numbers of infantry and even cavalry- had been invented by the Swiss and easily shared amongst the European states thanks to the development of the printed press (Eltis, p60) and the regular warfare amongst their near neighbours. The pike square, as an example, involved complex mathematics and organisation that went far beyond the current skills and systems in place, and forced the progression of these skills.

Siege tactics are also an example of changed methods. The reinforcement of castles underwent drastic changes using strategic angles in fortification and offensive positioning, and regarding the weaponry used in sieges, artillery underwent massive advancement. Artillery was indeed the main element that gave the European states their advantage. Eltis sums up the affect of this very well in saying 'firearms, hitherto ineffective, underwent improvements and emerged as the dominant force on the battlefield and in siege warfare. Strategy, the structure of command, training and organisation underwent profound changes as a result. Infantry and cavalry had now to be trained in unfamiliar formations and techniques when the very idea of collective training was new' (Eltis, p43). As a result of this, sovereigns started to move from mercenary armies that were hired seasonally, to standing armies that were collectively trained and equipped, not to mention, nationally aligned which helped improve nationalism. What ensued in the development of more advanced artillery was an 'arms race', where technology was under constant innovation and the quantity became important. 'Artillery and firearms quite transformed interstate warfare, economic life and the capitalist organisation of arms production' (Braudel, p291). This is because with the need for innovation and increasing numbers of artillery to be claimed by a state, the cost was catastrophic. Politically this meant that 'regional interests lost their ability to defy central authorities; small states and semi-independent regions were gobbled up by their larger neighbours' (Rogers, p74). Economically, 'European productive potential had increased enormously and Europe had become much more formidable. The… appearance of effective iron guns… gave Europe the possibility of expanding her artillery park at a relatively low cost, while progress in technology and business organisation allowed more efficient use of available resources' (Cipolla, p72). Whilst production might have been slowly becoming more efficient the scale meant it was still exhaustively expensive and so states followed the example of the Netherlands and created national banks to guarantee loan repayments, in order to have money lent to it for war (Rogers, p48). Trade also took on a new level of importance as a means of raising funds for war. Beyond the need to raise funds for war through international trade as a motivator to expand sea power, the technological development undergone in that area must be looked at.

Technology and methodology of sea power underwent radical changes in the sixteenth century. There were several changes to both ship structure and sea warfare. Along with the scientific revolution taking place, the development of the compass and open sea navigation meant that ships could venture further afield from Europe. Thanks to the shortage of labour from recurrent plagues after the middle of the fourteenth century, the invention of the sail meant that ships shifted from being oarsmen powered to sail powered (Cipolla, p80). The development of artillery that we've already discussed also transferred to ship warfare. The increased reliability and availability of cannons meant that the design of ships was changed and cannons were installed upon ships. The classic ram and board method of warfare now changed to that of distant cannon fire. Cipolla sums up this change in sea power well when saying that 'exchanging oarsmen for sails and warriors for guns meant essentially the exchange of human energy for inanimate power. By turning whole-heartedly to the gun-carrying sailing ship the Atlantic peoples broke down and harnessed, to their advantage, far larger quantities of power. It was then that European sails appeared aggressively on the most distant seas' (p81). This change however was only seen by the European states, so when the rest of the world was suddenly faced with the European fleets, they were drastically under-prepared for them and the affect they were to have on their countries.

Early voyages of exploration were in the name of trade for places where Christian monarchs were in place, and for acquisition where they were not (Parry, p114). There were two types of situations the Europeans faced when they ventured to the unknown rest of the world under the guise of trade and Christian evangelical aspirations. The first situation was that 'African and America were 'very primitive peoples…and we can paraphrase Paolo Giovio by saying that the noise of European artillery was enough to induce them "into the worship of Jesus Christ"' (Cipolla, p103-4). It was quickly realised by the Europeans that these continents were rich in natural resource and the native

peoples were easily conquered. A vast supply of resources for trade and slaves were now available to help fund their wars at home. The second situation the Europeans encountered was much more complex and challenging. In this instance, the peoples they faced were more technologically advanced but there were many cultural circumstances that left them unable to compete with the Western powers. Closer to home, the Turks had learnt the knowledge of artillery from the Western Europeans in the 1300s but had not developed beyond the rudimentary level. There were several reasons for this, most notably being that the Turks were so confident in their existing methodology of fighting that had repeatedly proven to be superior to that of the Western Europeans. Artillery at the stage it was at in that period was still considered unreliable to the Turks (Cipolla, p92) compared to their traditional methods. There were also cultural attitudes that left the Turks under-developed, that being that the nobles were traditionally the cavalry force in their army and it was considered inferior to their status to suddenly be reduced to artillery wielding infantrymen. With regards to sea power, the Turks up until this period had been a strong force on the sea, as evident by their ever-expanding empire. However the refusal to develop their artillery meant that they 'did not realise the importance and implication of the naval revolution that the Atlantic powers had accomplished. They remained "medieval" when the modern age had already begun' (Cipolla, p102). They were soon losing ground to the Western states when their sea power was out-stripped and battles were lost such as that of 1509 against the Portuguese. The Eastern states such as China reflects these circumstances in many ways. As early as the tenth century the Chinese were aware of gunpowder. However their use of it was drastically different; it was used as a scare-tactic, setting it alight to create loud noise to scare off their enemies (Cipolla, p104). Beyond this use, the Chinese never seriously developed artillery. One may ask why, when the Europeans did arrive, they never saw the opportunity to learn form them and try to compete with them militarily. 'At first sight the problem might appear to be merely one of introducing new methods of production and instruments, tools or machines appropriate thereto. But what is really involved is a vast change in social beliefs and practices' (Cipolla, p130). The Chinese have a complex culture; the gentry and scholar-officials were not favourable to

innovation, academics were more inclined to philosophy, language and art than war, and the Chinese masses were very much focussed on traditions with all classes sharing a contempt of soldiers and military matters (Cipolla, p119-121). The Westerners of course did not want the Eastern states to learn the knowledge that gave them an advantage. Whilst some knowledge was used as leverage for trade agreements, the Westerners also often banned the sharing of knowledge and used political manipulations to cause friction amongst the Eastern states. The situation was aptly observed by Feng Kuei-Fen when he said 'the most unparalleled anger which has ever existed since the creation of heaven and earth is exciting all who are conscious in there minds and have spirit in their blood …This is because the largest country on the globe today, with a vast area of ten thousand *li* is yet controlled by small barbarians… Why are they small and yet strong? Why are we large and yet weak?... What we have to learn from the barbarians is only one thing, solid ships and effective guns' (Cipolla, p126).

It can be said however that the Eastern states were already at a disadvantage before the Europeans even entered their awareness of existence. With such close proximity and an environment of near-constant conflict, the Western European states had developed technologically, and also culturally, that of a competitive nature. Philip II's servant Granvelle claimed that 'only a power in near constant conflict could hope to keep fully abreast of the technological and organisational change in the rapidly changing field of war' (Eltis, p99). Other than Europe, the rest of the world was not in this state of conflict and forced innovation; this left them severely behind in artillery and sea power technology. And without the pressure of the need to raise funds for war, economic development was slower and there wasn't a desire to expand their state for trade and access to more resources. This all combined to leave the European states as the most powerful and ambitious force in the world.

List of References

Braudel, F (1967), *The prince, Capitalism & material life 1400-1800.* USA: Fontana/Collins.

Cipolla, C. M (1996), *Guns, sails & empires: technological innovation & the early phases of European expansion 1400-1700*. USA: Sunflower University Press.

Eltis, D (1995), *The military revolution in 16th century Europe*. New York: IB Tauris Publishers.

Lynn, W Jr (1962), *Medieval technology & social change*. England: Oxford University Press.

Machiavelli, N (2005), *The prince*. Oxford: Oxford University Press.

Parry, J.H (1973), *The age of reconnaissance*. London: Weidenfield & Nicolson.

Rabb, T.K (1975), *The struggle for stability in early modern Europe*. New York: Oxford University Press.

Rogers, C.J (1995), *The military revolution debate: readings on the military transformation of early modern Europe*. San Francisco: Westview Press.

The maze of ingenuity: ideas & idealism in the development of technology (1992), 2nd edn. London: The MIT Press.